REMARKS/ARGUMENTS

Appreciation is extended to Examiner Halpern for the courtesy of granting a telephone interview on December 15, 2004. Arguments were presented to the Examiner as to why the combination of Tachibana and Lifanov do not support the rejection of Claim 21 under 35 U.S.C. 103. The comments set forth below with regard to Claim 21 were discussed with the Examiner during the interview. Furthermore, Lifanov, Murakami and Tachibana were discussed. The Examiner suggested that the arguments be presented in a formal response and that he would then consider the patentability of the claims after conducting an updated search.

With regard to Claim 21, this claim defines an apparatus for the melting and refining of glass wherein a skull crucible is combined with a melting vessel by way of a connecting line connected to a floor zone of the melting vessel as well as the floor zone of the refining vessel and further wherein a leak proof glass seal is located at a connection point of the connection line to the refining vessel wherein the seal is electrically shunted to ground potential.

The inventors have discovered that significant advantages flow from the utilization of an electrically shunted leak proof glass seal at the connection to the skull crucible when the skull crucible follows a melting vessel and further when a stirring crucible follows the skull crucible. In the past, such electrical shunts have not been employed for skull crucibles because they reduce the electrical efficiency of the inductive heating of such crucibles by influencing the high frequency fields surrounding the skull crucible leading to a drainage of high frequency energy. Accordingly, the state of the art utilizes glass seals which are isolated, typically using mica layers or the like.

In direct opposition to the state of the art, the inventors have discovered that when a skull crucible directly follows a conventional melting vessel, high frequency energy originating from the induction coil of the skull crucible is coupled to the melting vessel or a following stirring vessel. By utilizing an electrically shunted leak proof glass seal, the inventors have enabled this combination to be utilized.

The claims specifically call for the refining vessel to be configured as a skull crucible which, as is well known in the art and described on page 7 of the specification, may comprise segments with meandering water-cooled copper or stainless steel pipes that cool the crucible wall intensively to enable the higher refining temperatures. Although Tachibana discloses

melting and refining chambers connected by a throat, the refining chamber 6 of Tachibana is not a skull crucible as claimed.

Furthermore, Lifanov fails to disclose a leak proof glass seal located at a connection point of the floor zone connection to the refining vessel wherein the seal is electrically shunted to ground potential. There is no disclosure of the material for the collecting unit of Lifanov and it could possibly be made of a ceramic material which is non-electrically conductive. Furthermore, it is clear from Fig. 1 that the collector is located at a significant distance with respect to the high frequency induction coil. One of skill in the art would understand that an electrical shunt for a high frequency field must be arranged such that the inductive resistance is reasonably low, which implies that the shunt must be within the field produced by the high frequency induction coil.

Because Tachibana and Lifanov when combined do not meet all the limitations of Claim 21, it is submitted that this claim and the claims dependent thereon are not obvious within the meaning of 35 U.S.C. 103.

Claim 26 has been amended to correct a typographical error relating to the temperature of the melt. The refining temperature is now claimed as being above 1650°C, support for which is present at page 7, lines 24-27. As presently claimed, the refining temperature within the skull crucible of 1650°C is higher than the disclosed temperature range of set forth in Tachibana. Furthermore, Claim 26 calls for supplying the melt from the melting vessel to a refining vessel configured as a skull crucible which has the advantage that much higher temperatures can be reached, for example, as high as 3000°C. As discussed above, Tachibana does not disclose a skull crucible and therefore the temperatures which can be accommodated in Tachibana are in a lower temperature range than is the case with the method of the present invention. Murakami et al '111, although disclosing higher temperatures than Tachibana, similarly fails to disclose the step of supplying melt from the melting vessel to a refining vessel configured as a skull crucible. Accordingly, Tachibana combined with Murakami et al fails to disclose the limitations set forth in independent Claim 26 and Claim 26 and the claims dependent thereon are therefore not obvious over a combination of Tachibana and Murakami et al '111.

It is requested that the Examiner reconsider and withdraw the rejections of the claims.

Respectfully submitted,

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